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(71) Applicant: Dae Woo Electronics Co., Ltd.

(Representative: Soon Hoon, BAE)

541, Namdaemun-ro 5-ga, Jung-ju, Seoul

(72) Inventor: Joo Hyun, KIM

733-5, Yongdoo-dong, Dongdaemun-ku, Seoul

(74) Agent: Patent Attorney, Jong Soo, KIM

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(54) TELEVISION RECEIVER HAVING AUTOMATIC CHANNEL SEARCH  
FUNCTION USING SUB SCREEN

**ABSTRACT**

The present invention relates to a television receiver that has an automatic channel search function using a sub screen and allows execution of an automatic channel search function through the sub screen while a current channel is continuously watched through a main screen. A television receiver includes a key input unit, through which an instruction to execute the automatic channel search function through the sub screen is input, a tuner that executes broadcast selection for sub screen channels according to a predetermined control signal, a PIP processing unit that outputs a sub screen picture on the basis of a broadcast signal selected by the tuner, a synchronous signal detecting unit that separates and detects a synchronous signal from a composite picture signal of a channel selected by the tuner, a searched channel storage unit that stores channel data of searched normal broadcast channels on the basis of the detection result of the synchronous signal by the synchronous signal detecting unit, and a control unit that, when the instruction to execute the automatic channel search function is input through the key input unit, drives the tuner and controls such that sequential channel search for all broadcast frequencies is executed.

Representative Drawing

FIG. 2

## SPECIFICATION

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing the internal configuration of a known television receiver having a sub screen provision function.

FIG. 2 is a block diagram showing the internal configuration of a television receiver having an automatic channel search function using a sub screen according to a first embodiment of the present invention.

FIG. 3 is a diagram showing an output state of a predetermined guide screen for guiding a channel search result.

### Reference Numerals

- |  |                               |
|--|-------------------------------|
| 1: ANTENNA                                   | 7, 40: REMOTE CONTROL DEVICE  |
| 8, 41: RECEIVING UNIT                        | 9, 45: MICROPROCESSOR         |
| 11: PICTURE PROCESSING UNIT                  | 12: CRT DRIVING UNIT          |
| 13: CRT                                      | 20: SWITCH UNIT               |
| 22: FIRST TUNER                              | 23: FIRST IF AMPLIFYING UNIT  |
| 24: FIRST P/S SEPARATING UNIT                |                               |
| 25: FIRST PICTURE SIGNAL DETECTING UNIT      |                               |
| 26: FIRST SOUND SIGNAL DETECTING UNIT        |                               |
| 27: SECOND SOUND PROCESSING UNIT             |                               |
| 28: FIRST SOUND PROCESSING UNIT              |                               |
| 29: SOUND AMPLIFYING UNIT                    |                               |
| 30: SPEAKER                                  | 31: PIP PROCESSING UNIT       |
| 32: SECOND TUNER                             | 33: SECOND IF AMPLIFYING UNIT |
| 34: SECOND P/S SEPARATING UNIT               |                               |
| 35: SECOND PICTURE SIGNAL DETECTING UNIT     |                               |
| 36: SECOND SOUND SIGNAL DETECTING UNIT       |                               |
| 42: CHANNEL MEMORY                           |                               |
| 43: SECOND SYNCHRONOUS SIGNAL DETECTING UNIT |                               |
| 44: SEARCHED CHANNEL STORAGE UNIT            |                               |
| 46: OSD PATTERN STORAGE UNIT                 |                               |
| 47: OSD GENERATING UNIT                      |                               |

### Detailed Description of the Invention

#### Object of the Invention

#### Technical Field to which the Invention belongs and Prior Art

The present invention relates to a two-tuner television receiver having a sub screen function, and in particular, to a television receiver that has an automatic channel search

function using a sub screen main screen and allows execution of an automatic channel search function through the sub screen while a current channel is continuously watched through a main screen.

As one of television receivers (hereinafter, referred to as a TV receiver) that are placed on the market recently, there is known a TV receiver that adopts a sub screen function of dividing one screen so as to output two or more channel programs simultaneously. FIG. 1 shows the internal configuration of a TV receiver having a sub screen function.

In FIG. 1, reference numeral 22 denotes a first tuner for main screen channel selection, and reference numeral 23 denotes a first IF amplifying unit that amplifies an intermediate frequency (IF) output from the first tuner 22. Reference numeral 24 denotes a first P/S separating unit that separates the IF signal output from the first IF amplifying unit 23 into a picture intermediate frequency signal PIF and a sound intermediate frequency signal SIF. The first P/S separating unit 24 has, for example, a surface acoustic wave (SAW) filter. Reference numeral 25 denotes a first picture signal detecting unit that detects a picture signal from the picture intermediate frequency signal PIF1 separated by and output from the first P/S separating unit 24. Reference numeral 26 denotes a first sound signal detecting unit that detects a sound signal from the sound intermediate frequency signal SIF1 separated by and output from the first P/S separating unit 24.

Reference numeral 32 denotes a second tuner for sub screen (PIP; Picture In Picture) channel selection, and reference numeral 33 denotes a second IF amplifying unit that amplifies an intermediate frequency signal output from the second tuner 32. Reference numeral 34 denotes a second P/S separating unit that divides the IF signal output from the second IF amplifying unit 33 into a picture intermediate frequency signal PIF and a sound intermediate frequency signal SIF. The second P/S separating unit 34 has, for example, a SAW filter, like the first P/S separating unit 24. Reference numerals 35 and 36 denote a second picture signal detecting unit and a second sound signal detecting unit, respectively. The second picture signal detecting unit 35 and the second sound signal detecting unit 36 detect a picture signal and a sound signal from picture and sound intermediate frequency signals PIF2 and SIF2 separated by and output from the second P/S separating unit 34, respectively.

Reference numeral 7 denotes a remote control device that remotely controls the overall operation of the television receiver. Reference numeral 8 denotes a receiving unit that receives an infrared signal from the remote control device 7, converts the infrared signal into an electrical signal, and outputs the converted electrical signal. Reference numeral 9 denotes a microprocessor. The microprocessor 9 functions as a control unit that outputs a predetermined clock signal CL and a data signal DATA in order to

control the entire television receiver according to an assigned code signal output from the receiving unit 8.

Reference numeral 20 denotes a switch unit that selectively switches a composite picture signal output from the first and second picture signal detecting units 25 and 35 and sound signals output from the first and second sound signal detecting units 26 and 36 according to a predetermined control signal output from the microprocessor 9. Reference numeral 28 denotes a first sound processing unit that processes a sound signal for the main screen output from the switch unit 20 under the control of the microprocessor 9. Reference numeral 29 denotes a sound amplifying unit that amplifies the sound signal processed by the first sound processing unit 28 and outputs the amplified sound signal to a speaker 30 disposed at the back of the sound amplifying unit 29. Reference numeral 27 denotes a second sound processing unit that processes a sound signal for the sub screen output from the switch unit 20 and outputs the processed sound signal through a headphone jack (not shown) provided in a TV main body.

Reference numeral 31 denotes a PIP processing unit that receives a picture signal selectively output from the switch unit 20 as a sub screen picture signal and generates R' (red), G' (green), and B' (blue) signals and a blanking signal Y' for sub screen generation on the basis of the picture signal. Reference numeral 11 denotes a picture processing unit that outputs R, G, and B signals and a luminance signal Y for the output of the main screen and the sub screen on the basis of a main screen composite picture signal output from the switch unit 20 and R', G', and B' signals and the blanking signal Y' output from the PIP processing unit 31. Reference numeral 12 denotes a CRT driving unit that drives a CRT 13 on the basis of the R, G, and B signals and the luminance signal Y output from the picture processing unit 11.

According to the television receiver having the above-described configuration, when a user selects the sub screen function through the remote control device 7, the microprocessor 9 controls the first tuner 22 to select a channel to be output on the main screen and controls the second tuner 32 to select a channel to be output on the sub screen. The main screen picture signal selected by the first tuner 22 is processed by the picture processing unit 11, and the sub screen picture signal selected by the second tuner 32 is processed by the PIP processing unit 31. As a result, a main screen picture and a sub screen picture are output on the CRT 13 as one screen at a predetermined size ratio.

Meanwhile, in a known television receiver having a single tuner, if the automatic channel search function is executed, since a tuner for broadcast selection is just one, a program that is being watched cannot be watched until the channel search operation to be executed by the tuner is completed. In contrast, if the automatic channel search function is implemented using the sub screen function that is provided by the

above-described two-tuner TV, channel search can be normally executed without causing inconvenience in broadcasting watching.

#### Technical Problem to be solved by the Invention

The present invention has been finalized in consideration of the above problems, and it is an object of the invention to provide a television receiver that has an automatic channel search function using a sub screen and allows execution of the automatic channel search function through a sub screen while a broadcast of a current channel is continuously watched through a main screen, such that a channel search operation does not interrupt broadcast watching of a user.

#### Configuration and Operation

In order to achieve the above object, a television receiver having an automatic channel search function according to the present invention includes a key input unit, through which an instruction to execute the automatic channel search function through the sub screen is input, a tuner that executes broadcast selection for sub screen channels according to a predetermined control signal, a PIP processing unit that outputs a sub screen picture on the basis of a broadcast signal selected by the tuner, a synchronous signal detecting unit that separates and detects a synchronous signal from a composite picture signal of a channel selected by the tuner, a searched channel storage unit that stores channel data of searched normal broadcast channels on the basis of the detection result of the synchronous signal by the synchronous signal detecting unit, and a control unit that, when the instruction to execute the automatic channel search function is input through the key input unit, drives the tuner and controls such that sequential channel search for all broadcast frequencies is executed.

That is, according to the television receiver of the present invention having the above configuration, since the automatic channel search function is executed using an additional tuner for sub screen channel selection, channel search can be executed without causing inconvenience in TV watching.

Hereinafter, an embodiment according to the present invention will be described with reference to the accompanying drawings.

FIG. 2 is a block diagram of a television receiver having an automatic channel search function using a sub screen according to a first embodiment of the present invention. In FIG. 2, parts that perform the substantially same functions as those shown in FIG. 1 are represented by the same reference numerals, and the descriptions thereof will be omitted.

In FIG. 2, reference numeral 40 denotes a remote control device that has an execution key of the automatic channel search function through the sub screen. Reference

numeral 41 denotes a receiving unit that receives an infrared signal from the remote control device 40, converts the infrared signal into an electrical code signal, and outputs the converted code signal. Reference numeral 45 denotes a microprocessor. The microprocessor 45 functions as a control unit that controls the overall operation for a sub screen channel search function on the basis of the code signal applied from the receiving unit 41.

Reference numeral 42 denotes a channel memory that stores channel selection data for broadcast selection. Reference numeral 43 denotes a second synchronous signal detecting unit that separates and detects a synchronous signal from a composite picture signal of a sub screen picture output from the second picture signal detecting unit 35. Reference numeral 44 denotes a searched channel storage unit that stores channel data of searched normal broadcast channels on the basis of the detection result of the synchronous signal.

Reference numeral 46 denotes an OSD pattern storage unit that stores predetermined OSD pattern data for guiding the search result by the automatic channel search function to the user. Reference numeral 47 denotes an OSD generating unit that outputs R, G, and B signals and a blanking signal Y for the output of a predetermined guide caption relative to the channel search result on the basis of the data stored in the OSD pattern storage unit 46 under the control of the microprocessor 45.

Next, the operation of the television receiver having the above-described configuration will be described.

If the user selects a predetermined function key (not shown) provided in the remote control device 40 while watching the TV, the microprocessor 45 controls the switch unit 20 and the PIP processing unit 31 to switch the television receiver to a sub screen output mode and controls the second tuner 32 on the basis of selection data stored in the channel memory 42 to sequentially execute channel search from a low broadcast frequency.

At this time, the second synchronous signal detecting unit 43 detects the synchronous signal from the composite picture signal output from the second picture signal detecting unit 35 as a normal broadcast channel is selected by the second tuner 32. Each time the synchronous signal is detected, for example, a high-level detection signal is output to the microprocessor 45.

The microprocessor 45 registers selection data of a currently selected channel in the searched channel storage unit 44 each time the high-level detection signal is applied from the second synchronous signal detecting unit 43. If the registration is completed, the frequency is gradually increased, and then a search operation for remaining channels is continued.

Meanwhile, during the channel search, a signal broadcast channel to be searched every moment is output from time to time through the sub screen, and thus the user can confirm the progress state of the channel search from time to time.

Thereafter, if the channel search operation is completed, the microprocessor 45 releases the sub screen output mode and outputs a predetermined control signal for guiding the search result to the OSD generating unit 47 on the basis of the data registered in the searched channel storage unit 44. Then, the OSD generating unit 47 reads out the data stored in the OSD pattern storage unit 46 according to the control signal applied from the microprocessor 45 and outputs predetermined R, G, and B signals and a blanking signal 'Y' for the output of a search result guide caption to the picture processing unit 11. As a result, as shown in FIG. 3, a predetermined guide screen for guiding the channel search result is output through the CRT 13, and thus the user confirms the search result.

That is, according to the above embodiment, it is possible to implement a television receiver that has an automatic channel search function using a sub screen and allows execution of the automatic channel search function through a sub screen while a current channel is continuously watched through a main screen.

Meanwhile, the present invention is not limited to the above embodiment, but various modifications can be made within the scope without departing from the technical subject matter of the present invention.

#### Effects of the Invention

As described above, according to the present invention, since the automatic channel search function is executed using an additional tuner for sub screen channel selection, channel search can be executed without causing inconvenience in TV watching.



## (57) Claims

### Claim 1

A television receiver having an automatic channel search function using a sub screen, the television receiver comprising:

a key input unit, through which an instruction to execute the automatic channel search function through the sub screen is input;

a tuner that executes broadcast selection for sub screen channels according to a predetermined control signal;

a PIP processing unit that outputs a sub screen picture on the basis of a broadcast signal selected by the tuner;

a synchronous signal detecting unit that separates and detects a synchronous signal from a composite picture signal of a channel selected by the tuner;

a searched channel storage unit that stores channel data of searched normal broadcast channels on the basis of the detection result of the synchronous signal by the synchronous signal detecting unit; and

a control unit that, when the instruction to execute the automatic channel search function is input through the key input unit, drives the tuner and controls such that sequential channel search for all broadcast frequencies is executed.

### Claim 2

The television receiver having an automatic channel search function using a sub screen according to claim 1, further comprising:

an OSD generating unit that outputs a predetermined OSD caption pattern for guiding the execution result of the automatic channel search function according to the predetermined control signal from the control unit.